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File No. 50035

IMAGERY EXPERIMENTATION SUPPORT
FINAL REPORT
FOR 1 JULY 1969 THROUGH 30 JUNE 1970

NGA review(s) completed.

Introduction:

General

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Work performed by [redacted] over fiscal year 1970 can be separated into four tasks. Task I involved the administration of a study dealing with the identification of ground order of battle targets on line-scan and photographic imagery. Task II [redacted] directed two camera flight tests and Task III included coordinating three aerial flight programs over military facilities, analyzing the imagery, and the collection of ground truth and taking photographs of the targets. Two complete packages of all the targets were assembled for an additional ground order of battle study. Task IV provided assistance in the image simulation for a ground order of battle study utilizing "real targets" on aerial photography.

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Task I

The administration of the ground order of battle study using models as targets ran for approximately three weeks duration. In addition to the forty subjects at NPIC, ten subjects from [redacted] also served as subjects for the study. The results of the study were delivered to [redacted] produced the final report. Target identification boards of the models contained on the imagery were built and arranged by [redacted]

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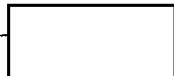
Task II

The two camera flight tests involved checking out a camera system that would provide between 1 to 2 inch ground resolution defined by reading a set of tri-bar targets. These targets were made at various contrasts for the test. Many camera runs were flown covering a wide range of shutter speeds and aperture settings. The optimum setting turned out to be on aperture of F-4 and a shutter speed of 1:380 for the Kodak 3404 aerial film. The flight tests took place at [redacted] Turbo-Porter aircraft. A report of the flight tests was produced at the end of the program.

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Task III

The collection of aerial photography over military field forces took place at three locations,

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The first acquisition program took place at where the target area was a World War II museum of tracked vehicles and artillery. The resolution estimated by reading the object and bar targets was approximately 1.5 inches in the center and forward portion of the frame format. Two flights were made, one in the morning and the other in the afternoon. The attached image evaluation forms are examples of those used for all the flights. They contain the optimum resolution for each flight line over the resolution targets.

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The acquisition program took place over the missile display area in Flight line plots were made and the overall flight coordination was handled by Photos and ground truth were collected at the time of the overflights. Besides the black and white aerial photography, 242 color film was also used. It has not been determined what was the problem, but both the color and black and white imagery were degraded to about three inch ground resolution. Ten days later when the photography was flown, high resolution was obtained thus eliminating a permanent camera malfunction.

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The final flight program took place at over the motorpool. The weather conditions were poor for the aerial acquisition with strong winds up to 25 knots and large cumulus clouds. Many duplicate flight lines were flown and a small portion of the imagery turned out to provide the best quality of the acquisition program. The resolution was judged to be between 1 and 1½ inches.

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Task IV

This task provided assistance in selecting and evaluating image examples for the imagery simulation. The simulation changed scale and resolutions from an original high quality negative. This work was performed by

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Trips taken in support of the contract are as follows:

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RUN	ALT. (ft.)	f No.	SHUTTER SPEED	BAR	TARGETS			GRD. RESOL.		EXPOSURE						REMARKS		
					Δ	O	□	L/MM	FT	IN	OVER	UNDER	GOOD	FAIR	POOR		SMEAR	VIBR.
1	500	2.8	1/400	32				50		1.7			X			X		40% overlaps Too far to right - DMC
2		2.8	1/400	32				50		1.7			X			X		
3		4	1/400	32				50		1.7			X			X		
4		4	1/400	34				58		1.4			X				X	Slight vibration
5		2.8	1/800	34				58		1.4		X	X					Tgt. not centered
6		2.8	1/800	34	2	1	1/21	1/2	58		1.4			X				Good readings
7		4	1/200	32				50		1.7	X			X		X		Best centered
8		4	1/200	--							X				X	X		Too much smear/precludes readings
																		Light reading from A/C (80)
																		1/3 trailing edge fuzzy The day was hazy
																		Time 1323-1333
																		V/H good for objects under 40' in height

RUN	ALT. (ft.)	f No.	SHUTTER SPEED	TARGETS				GRD. RESOL.			EXPOSURE							REMARKS
				BAR	Δ	○	□	L/MM	FT	IN	OVER	UNDER	GOOD	FAIR	POOR	SMEAR	VIBR.	
1	500	2.8	1/400	32				50		1.7			X					40% overlap
2		4	1/400	32	w/B 2	w/B 1	w/B 1/2	50		1.7			X				slight X	Best position
3		2.8	1/800	--								X					X	Too far left
4		2.8	1/800	34				58		1.4		X	X					"
5		2.8	1/800	34				58		1.4		X	X					Back rows fuzzy
6		4	1/200	34				58		1.4			X					Off-set
7		4	1/200										X					Road
8		2.8	1/800										X					"
9		2.8	1/400										X					"
10		4	1/400										X					"
																		The 1/3 trailing edge of
																		the frame has less light
																		and is slightly fuzzy.
																		Light reading from A/C (80)
																		The day was hazy
																		Time 1051-1112
																		V/H good for objects
																		under 40' in height

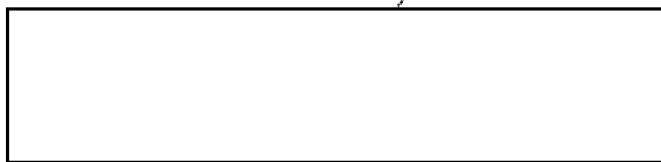
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A Comparative Analysis of
Photographs include
FT-15 Photo Quality Ref.

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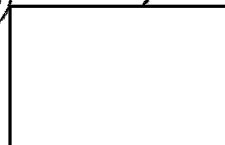


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